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ABSTRACT

This study examined the types of knowledge influencing classroom teaching in higher education. A total of 102 professors from across North America regarded as exemplary teachers participated in the study. Respondents were asked to recall a time during the last 3 years when they thought that they had done a poor job of teaching as well as a time when they felt that they had done an exemplary job of teaching. Respondents were then asked to indicate what types of knowledge had influenced their teaching at each time. The results indicated that four types of knowledge influenced classroom teaching: content knowledge, pedagogical content knowledge, current knowledge of learners, and knowledge of learners' background and appropriate pedagogy. Types of knowledge found not to have a significant impact on classroom teaching included knowledge of curriculum and knowledge of teaching routines. The results were used to develop a model of the knowledge base for teaching in higher education. The findings of the study support the claims that university professors base their teaching, to a large extent, on their knowledge of content. (Contains 32 references.) (MDM)

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Memorable events in the classroom: types of knowledge influencing professors classroom teaching.

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Objective

The objective of this study was to determine the types of knowledge (e.g., content, pedagogical, etc.) that professors report drawing upon during memorable classroom teaching events.

Perspectives & Theoretical Framework

For those working in higher education, or studying at the present time, it is clear that the idyllic days of the ivory tower have long past, and change is underway. In addition to dealing with diminished budgets and increased pressures in the areas of research and service, there is an increased pressure on schools, and individual faculty, to contend with changes in the mix of students, the impact of technology, an anticipated increase of turnover of academic staff in the next decade, and a general increase in the demand for quality teaching (Benson & Lewis, 1994; Millis, 1994). While the recent literature in the field clearly indicates that professors and institutions of higher learning are paying a greater amount of attention to teaching and are integrating it into notions of good scholarship (e.g., Altbach, 1995; Boyer, 1990, Collison, 1991; Millis, 1994; Seldin, 1991), there are many gaps in our understanding about teaching in higher education.

The bulk of research on teaching has taken place in elementary and secondary school settings. This contextual difference is evident in reviewing the research addressing the knowledge that informs teaching. Shulman (1986), Leinhardt (1993), and a number of others (e.g., Grossman, 1992; Wilson, 1988) assert that there are a number of types of knowledge that influence teaching including knowledge of content, pedagogy, and curriculum. In addition, Shulman (1986) suggests a type of knowledge called pedagogical content knowledge, which he defines as "the ways of representing and formulating the subject that make it comprehensible to others." (1986, p. 9). It includes knowledge of the most often taught topics in an area as well

as the most useful ways of representing those topics to learners including selecting the best examples, analogies, demonstrations, explanations, and so on.

In reviewing this body of work, it is clear that knowledge of pedagogy is seen as one of the principle types of knowledge used in the classroom. Using these theories to making meaning of teaching in higher education seems dubious given the obvious differences in the training of the teachers and professors. Teachers typically have less content training than professors, but are formally trained in pedagogy. Conversely, professors, are extremely well versed in content but have not received formal training in teaching. Accordingly, the purpose of this study was to investigate the types of knowledge influencing classroom teaching in higher education.

Methods

A total of 102 professors from across North America took part in this study. Professors were selected from national directories of organizations, by recommendation of faculty development centers at colleges and universities, and from lists of award winning professors. Respondents were drawn from 38 different disciplines representing a range of the arts, science, humanities, and the professions. The mean number of years teaching for the sample was 14.68 years (SD=8.79). Seventy-one percent of respondents had an earned Ph.D., while seventeen percent had a master's degree, and the remaining respondents had professional degrees (e.g., MD, etc.).

Once they agreed to participate in the study, professors received a package of material guiding their recall of two memorable events concerning their classroom teaching that had occurred within the last three years. They were instructed to recall a time when they thought they had done a "poor" job of teaching as well as a time when they felt they had done and "exemplary" job of teaching. For each incident or memorable event, respondents completed a series of opened ended questions used

to stimulate and activate their memory; questions included a description of the time, place, and students present, what happened, what they did, how they felt, and what made it memorable. After completing the opened ended questions, respondents were asked to respond to a series of questions drawn from the literature on teacher knowledge; there were 60 questions representing knowledge of pedagogy, content, learners, and pedagogical content knowledge. Respondents rated their response on an seven point Likert-type scale indicating the extent to which they felt that this type of knowledge actually influenced their teaching at that time. The advantage of this method is in situating them at a specific time and place. The ratings collected minimize professors opinions about what one "should" know, and emphasizes they knowledge that actually influenced their thinking and actions. Respondents were also asked to complete a teaching profile indicating their academic training, years of experience, student and self ratings, teaching load, and so on.

The primary data source for this study were the ratings of the items that influenced their teaching. The aim of the data analysis was to determine which items form subsets of knowledge of teaching in higher education, and to operationally define the resulting factors. Ratings were submitted to a principle components analysis (PCA) to investigate underlying types and organization of knowledge involved in the process of teaching (e.g., Tabachnick & Fidell, 1989). After completing a preliminary principle components analysis, drawing scree plots, and determining the appropriate number of factors for the solution, responses were re-analyzed using an orthogonal varimax rotation. In order to complete the analysis, data from both poor and exemplary incidents were collapsed as theoretically, the same knowledge base is in place during any given teaching incident. Including both types of incidents in the same analysis also represents a

broad range of teaching situations drawing on more complete knowledge base than could be achieved by analyzing poor and exemplary events separately.

After the PCA was calculated, the resulting factors were named based on the items that loaded highly on them. Next, factor score coefficients were calculated for each memorable event to facilitate comparison among the factors (factors coefficient scores have a mean of zero and a standard deviation of one) and to select incidents that typify each type of knowledge. Definitions of each type of knowledge were generated based on the items form the PCA as well as based on respondents' descriptions of the teaching incident.

Results

The principle component analysis of knowledge actually influencing teaching at the time of the incident resulted in a four factor solution accounting for 54.53 percent of the variance. The items that formed each of the factors are outlined in Table one. The items were used to generate definitions of each type of knowledge in conjunction with summaries of respondents' description of memorable teaching incidents that were selected by scoring them according to the factor structure. Factor score coefficients were generated for each incident and incidents were selected as exemplars of the factor or type of knowledge if they had a factor score coefficient of one or above on a given factor. If the incident had another factor score coefficient above one on the three other factors, it was not selected to characterize the factor as it showed that two types of knowledge were involved. A total of 99 incidents (48.53% of all incidents) were identified as exemplars for the factors. The definitions outlined below are followed by a discussion of types of knowledge drawn upon as well as the types of knowledge not found as part of the knowledge base for teaching in higher education. Then a model for the knowledge base for teaching in higher education is proposed followed by a discussion of the theoretical significance of the findings.

Table 1

Summary of High Loading ITQ Items from Principle Component Analysis of Knowledge Influencing Teaching.

Factor Name	Influenced by Pedagogical Content Knowledge	Influenced by Current Knowledge of Learners and Evaluation
Factor Number	Factor 1	Factor 2
Percent of Total Variance Explained	16.22%	15.23 %
Items	I had a well constructed plan of how I would teach and knew best teaching strategies, examples, analogies, sequencing, scope of material, and its application outside the classroom as well as, and knew how to manage time in class. I knew appropriate material and resources for teaching , its place in overall program of study. Knew students' current understanding of the content.	I felt knowledgeable about students' expectations and study habits in this class. I based my teaching on what I know about students' learning styles or preferences, about ways in which students went about learning the content. I knew some ways to evaluate students' learning (in general), knew how to evaluate their learning on this particular content, and knew how to evaluate my teaching.

Table continues on next page

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Factor Name	Influenced by Knowledge of Content	Influenced by knowledge of Learners' Background, Appropriate Pedagogy, and Disposition Towards Teaching
Factor Number	Factor 3	Factor - 4
Percent of Total Variance Explained	13.19%	10.44 %
Shared Items	I had to have a comprehensive knowledge base in my field, know "good" and "bad" work, its relationships to other subjects, and its "culture", and my own intellectual dispositions toward the content. I was knowledgeable about current research in my field.	Considers students' social background, orientation to learning. Needed to know about classroom management, a variety of teaching techniques, and something about theories of learning and instruction. Knew students' overall level of ability. I was aware of my own intellectual and personal disposition towards teaching.
Cumulative Variance Explained (four factors)		54.53%

Types of Teacher Knowledge

In reviewing the four types of knowledge outlined below, it is important to recall that the factors were based on strong inter-correlations among respondents' ratings of the items but each item did have, to varying degrees, weaker relationships with the other factors. Similarly, respondents' descriptions of each of the critical incidents selected to typify a particular type of knowledge also indicate relationships with the other types of knowledge. In other words, no one type of teacher knowledge can be completely extricated from the others types of knowledge that form a complete knowledge base.

Content knowledge

The results of this study indicate that content knowledge in teaching in higher education entails having a comprehensive knowledge base in one's field. As the field evolves, so does the individual's knowledge base for teaching. It includes knowing the culture of the discipline including "good" and "bad" work, knowing one's own disposition toward the content and its relationship to other subjects, and conveying one's own views of content to students. Content knowledge includes knowing which content needs to be emphasized and it guides one's selection of good examples during teaching. It also influences the degree of success in selecting and conveying the desired amount of content to students as well as the flow of the presentation. Finally, content knowledge helps avoid mistakes and maintain credibility with students while eliciting their interest in the field.

This definition of content knowledge is broader than most definitions that have been generated from studies conducted in elementary and high school settings (e.g., Bates, 1993; Leinhardt & Smith, 1985; Rovegno, 1992). Whereas those studies suggest that content knowledge is primarily declarative knowledge of a discipline (e.g., Alexander et al., 1991) or knowledge that individuals have about a particular field of study that supports teaching, findings from the present study suggest that

content knowledge in the context of teaching in higher education includes both declarative (i.e., knowledge of "what") and procedural (i.e., knowledge of "how") forms of knowledge. Furthermore, elements that are typically thought of as pedagogical content knowledge, and to some extent, even general pedagogical knowledge seem to be part and parcel of content knowledge (e.g., use of examples, flow of presentation, etc.).

Pedagogical Content Knowledge

The results of this study indicate that pedagogical content knowledge in teaching in higher education entails having a well constructed, yet often flexible, plan of how to teach specific content. It involves teaching that is responsive to feedback from students and knowing how to strike a balance between following one's planned instruction and fostering student thinking and understanding. Pedagogical content knowledge includes knowledge of how to manage time in class, the scope of material that is relevant to the teaching situation, and its application outside the classroom. It entails knowledge of the best teaching strategies which facilitate interaction and overcome areas of common difficulty for learners through the use of the best examples, analogies, and effective sequencing of material to be taught.

Despite minor differences in the definition outlined above, overall the findings from this study support descriptions by researchers such as Shulman (1986b), Gudmundsdottir (1991), Marks (1990) as well as elaborations by Reynolds (1992). These researchers have suggested that pedagogical content knowledge entails representing or converting knowledge of content into a form that students can learn (e.g., Hashweh, 1987). They all highlight the importance of examples and analogies and teaching strategies in fostering student learning.

Of particular note is the inclusion of knowledge of students' understanding and potential misunderstandings in the definition above. Both Shulman (1986b)

and Reynolds (1992) have reached the same conclusion. This particular element of knowledge has often been cited as the key difference between subject matter experts and subject matter experts who teach (Grossman & Richert, 1988; Hashweh, 1987; Shulman, 1986b; Sternberg & Horvath, 1995); the former said to draw principally upon content knowledge, whereas the latter draws on both content and pedagogical content knowledge (e.g., Hashweh, 1987).

While the definition derived from the present study supports Grossman's (1989) conception of pedagogical content knowledge involving knowledge of the scope of material to include in teaching, it does not support her claim of the role this type of knowledge has in conceptual decision making. Perhaps tangentially, this is an indication that, in higher education, pedagogical content knowledge bears a similar weight to other types of teacher knowledge in collectively guiding teaching practice.

Also of note is that the definition includes knowledge of how to manage time in class. Time management is typically considered part of pedagogical knowledge (e.g., Reynolds, 1992) and its inclusion in pedagogical content knowledge is an example of the way in which knowledge of pedagogy seems to be distributed among the existing knowledge structures for teaching in higher education rather than forming its own type of knowledge.

Current Knowledge of Learners

The results of this study indicate that current or in-class knowledge of learners for post secondary educators entails knowledge of students' expectations as well as a continuous awareness and monitoring of their understanding. Moreover, it involves communication and interaction with students including challenging them and being challenged by them.

This type of knowledge seems conceptually different in content and scope than definitions found in the existing literature which only include elements of

knowledge of learners as part of general pedagogical knowledge (Reynolds, 1992; Shulman, 1986b) or as part of general pedagogical skills (Leinhardt & Smith, 1985). While the definition above does include aspects of pedagogy, it seems much closer to the elements of pedagogical reasoning (Shulman, 1987) and the cognitive skills of teaching (Clark & Peterson, 1986). For example, the definition of current knowledge of learners outlined in this study, emphasizes communication, an essential aspect of Clark and Peterson's (1986) description of interactive decision making while teaching. Similarly, the model of pedagogical reasoning outlined by L. Shulman (1987) clearly indicates that knowledge of learners and their characteristics is considered in the adaptation of material to meet student expectations. Further, the model of pedagogical reasoning also includes ongoing processes of monitoring students for their understanding, evaluating their learning, and reflecting on one's own teaching. Accordingly, this type of knowledge seems to primarily represent the knowledge gathered at the time of teaching rather than a specific body of knowledge about students, which is described in the definition that follows.

Knowledge of Learners' Background and Appropriate Pedagogy

The results of this study indicate that knowledge of learners' background and appropriate pedagogy entails considering students' social background and orientation to learning and combining it with one's knowledge of planning and enacting the appropriate teaching activities. It also draws on one's knowledge of classroom management and smooth presentation, knowledge of a variety of teaching techniques, and knowledge of theories of learning and instruction.

As with other definitions of knowledge derived from this study, this type of knowledge seems to go well beyond the established definitions of general pedagogical skills (Leinhardt, 1990; Leinhardt & Smith, 1985) general pedagogical knowledge (e.g., Reynolds, 1992; Shulman 1986b; Tittle, 1994), or knowledge of learners (Reynolds, 1992; 1986b). These existing definitions address learners'

background, teacher's beliefs about learners, and knowledge of pedagogy separately. However, the results of the present study suggest that for those teaching in higher education knowledge of learner's background and pedagogical knowledge are combined. Indeed, of the four types of knowledge of university teaching found in this study, knowledge of learners' background and appropriate pedagogy had the most striking mix of two often cited types of teacher knowledge. The pedagogical nature of this factor supports the assertions made by Fenstermacher (1994) and Kagan (1992) that professors draw their notions of teaching from their own experiences "on the job". Further, it suggests that these experiences result in a different kind of knowledge base, structured differently for teaching in higher education, than that which is found or required in other educational milieus.

Overall, the scope of the definition of learner's background and appropriate pedagogy, like the definitions of content knowledge and current knowledge of learners described earlier, distinguish the knowledge base for teaching in higher education from the knowledge base for teaching in other settings.

Types of Knowledge not Included

The purpose of this section is to elaborate on the definitions of the four types of teacher knowledge for higher education in terms of some of the elements that might have been expected to be included, but were not found relevant based on respondents ITQ ratings or their descriptions of the critical incidents outlined on the CIQ.

As outlined earlier, the 38 of the 60 ITQ items were based on the many accounts of teacher knowledge in the current literature put in the form of statements and presented in a random order. The other 22 questions were drawn from the pilot study (Rahilly & Saroyan, 1995) and included aspects of the cognitive "processes" associated with teaching (e.g., "I was aware that I was thinking about my actions while teaching"), as well as the "goals" of teaching based largely on the

Ramsden's (1992) theories of teaching (e.g., "I knew I wanted to teach in a way that would make learning possible."). While all of these questions were included in the analysis, none of them were found on the factors, nor were they explicitly evident in the open-ended descriptions of the teaching incidents provided on the CIQ. For the purposes of this discussion, their absence should be noted, and this finding will be discussed later in relation to the strengths and limitations of the methods used in this study. With a few notable exceptions, the rest of the ITQ items were included on one of the factors resulting from the principle components analysis. The first two ITQ items were not included on any of the factors; this can be attributed to some kind of warm-up effect of completing the questionnaire.

Knowledge of Curriculum. Knowledge of curriculum and curricular materials did not figure prominently in the results from the principle components analyses, nor in respondents' descriptions of the teaching incidents. Calderhead (1988) has suggested that knowledge of curriculum may have little influence on teachers' planning and classroom action among those who have been trained in this area. On the other hand, Tittle (1994) suggests that knowledge of curriculum is a part of conceptual skills that is one of the five levels of evaluation of knowledge upon which teachers can be assessed and such knowledge does influence classroom teaching. In this study, one ITQ item "I knew which were the most appropriate materials and resources to teach the content" was included on the pedagogical content matter factor for knowledge actually influencing teaching at the time of the incident. Knowledge of curriculum was not found in the PCA for knowledge considered, nor was it evident in respondents' descriptions of classroom events collected using the CIQ. Overall, evidence of knowledge of curriculum, materials, and students' academic programs was weak and were not included in the definitions above. Based on Calderhead's (1988) finding, is seems possible that respondents may indeed possess this type of knowledge, but the findings of this

study indicate that it was not relevant in the poor or exemplary teaching incidents collected.

Knowledge of Teaching Routines. Leinhardt (1990) and Leinhardt and Greeno (1991) elaborated on earlier work (e.g., Leinhardt & Smith, 1985) on the knowledge base for teaching and lesson structure to include teaching routines and schemata for rapid on-line decision making and classroom management at a global level (e.g., checking student understanding) and on a smaller level (e.g., distributing teaching materials). In this study, the ITQ "I had a routine to effectively manage my teaching" was one of the few not to be included on any factor on either of the PCA solutions. This item fell just below the cut off score for inclusion on the pedagogical content knowledge factor for the PCA of knowledge that was relevant and considered at the time of the teaching incident, and fell well below the criterion for inclusion on the pedagogical content knowledge factor for the PCA of knowledge that actually influenced teaching at that time. Teaching routines were also not noted in the descriptions of the incidents on the CIQ. The absence of this type of knowledge or explicit reference to lesson structure it the knowledge base for university teaching is conspicuous. One possible explanation for its absence from the factors could be that the item is conceptually more similar to the goals and process items from the ITQ than the other types of knowledge. However, this type of knowledge was not evident in the pilot study either suggesting that it higher education, classroom routines may not be frequent or may play a different role in teaching.

A Model of the Knowledge Base for Teaching in Higher Education

The findings of this study highlight some important issues with regard to the indeterminacy associated with defining types of teacher knowledge and recognizing the relationship within the knowledge base for teaching. In this section the

relationship among the types of teacher knowledge in higher education is presented in a model and is discussed in relation to the existing literature.

Much of the work on teacher knowledge outlined in the literature is based on data gathering techniques such as observation, journaling, and narratives (e.g., Grossman & Richert, 1988; Munby, 1986, etc.). These methods have been used in order to reduce the data and attempt to make distinctions in the types of knowledge drawn upon in teaching. The aim of this study was also to make distinctions among the types of knowledge drawn upon in teaching at the university level. However, the methodology used was based on respondents' judgments to determine the elements of knowledge that they considered and drew upon in their teaching. The strength of this method is that respondents' ratings can first be used to indicate the elements that form a type of knowledge, and can then be used to observe when two or more types of knowledge are involved in any given teaching incident. Thus, if an element of what is defined as pedagogical knowledge is observed, it is weighed against the other types of knowledge drawn upon in the incident. In other words, the model of knowledge is not imposed on the data; instead it emerges from the data. Using this method the influence of each type of knowledge in a given teaching incident becomes apparent.

At the outset a relationship among the factors or types of knowledge outlined in this study was expected since these types of knowledge collectively represent a complete knowledge base for teaching. This relationship was evident in the observation that approximately half of incidents collected in this study had factor coefficient scores indicating a high influence of more than one factor or type of teacher knowledge.

Like other studies reported in the literature, the results of this study are outlined in a fashion that may suggest a clear delineation among the different types of teacher knowledge. However, it would be extremely difficult to generate

definitions of teacher knowledge that included clear delineations among the different types of knowledge a teacher's knowledge base or in a given teaching incident. The definitions of teacher knowledge outlined in this study indicate general guidelines or signposts for recognizing the different types of teacher knowledge; the definitions are not absolute and may vary from one discipline to another and among professors.

A proposed model of the inter-relation of the types of knowledge is outlined (see Figure 1) based on the results of the principle components analysis and the open-ended description of the memorable or critical incidents of teaching. The model is a composite of the possible knowledge base for teaching in higher education but is not intended to represent every individual in the sample or every incident described. Instead, the model is based on the following features. First, it is base on general trends such as the dominance of content knowledge which, depending of the teaching situation, included aspects of pedagogical knowledge, current knowledge of learners, and knowledge of learners' background and appropriate pedagogy. Second, the presence of what is typically though of as pedagogical knowledge is incorporated in other types of knowledge and not as type of knowledge on its own. Pedagogical knowledge in this form appears to support teaching endeavors, but not drive it. Third, it indicates overlapping areas within the knowledge base for teaching in higher education that may at times be labeled as one type of knowledge or another by different individuals teaching in different contexts. Fourth, it indicates the presence of knowledge that is both declarative and procedural in nature for all types of knowledge. Types of knowledge with more or less of each of these forms of knowledge have been placed to represent the findings from the current study.

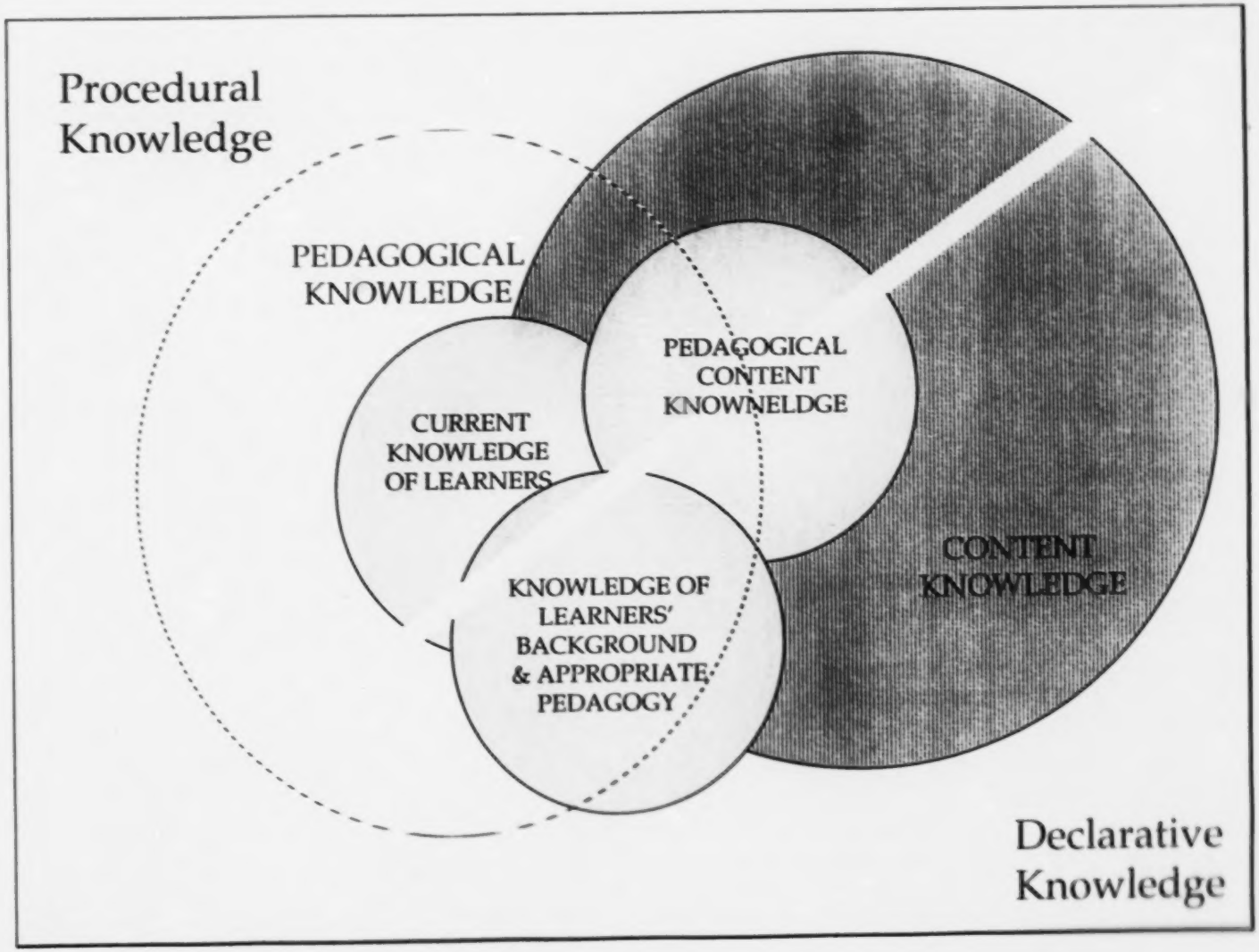

Figure 1. A model of the Inter-Relation of Different Types of Teacher Knowledge

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This model could be elaborated by including specific elements of each of the definitions outlined in this study. The present level of abstraction it is meant as a guide to examine the knowledge base for teaching in higher education. However, if an element of knowledge such as "selecting examples" for teaching is placed in the model, where would it go? In some cases, this might be completely a decision based on knowledge of content. In other cases it may be based on pedagogical content knowledge, current knowledge of learners, and knowledge of their background. Most likely, in any given situation, the influence of each of these types of knowledge would influence the choice to some extent.

When compared to the models of teacher knowledge outlined by Leinhardt & Smith (1985), this model is more complex, yet does not include lesson structure or general teaching skills. The latter, which seems to be more procedural in nature, can be assumed to fall in the area of pedagogical knowledge, but only specific elements of general teaching skills would be reflected in the current model. Compared to Shulman's (1986b) model the current model contains a similar number of elements. However, the elements in this model are not presented in a hierarchical manner and the divisions among the types of knowledge are not as clear cut. For example, general pedagogical knowledge is not completely separate from content knowledge. The models also differ in that the current model does not include curricular knowledge, but does clearly indicate the inclusion of both procedural and declarative aspects of teacher knowledge.

Theoretical Significance of Findings

This study set out to address the knowledge base drawn on in teaching in higher education. As outlined in the literature, there are a number of accounts of the teacher knowledge that reflect the different ways in which a number of common elements can be divided (Gudmundsdottir, 1991; Grossman & Richert, 1988; Kagan, 1992; Leinhardt & Smith, 1985; Fenstermacher, 1994; Reynolds, 1992; Shulman,

1986b; Wilson, 1988). The items of the ITQ can be arranged according to these descriptions to reflect theories of teacher knowledge posited by researchers such as Shulman (1986b), Leinhardt and Smith (1985), or most other accounts of teaching in various settings, levels of education, and milieus.

The results from this study, based on actual accounts of teaching in the university classroom, do not support the traditional delineation of teacher knowledge into any of the frameworks outlined in the literature. Findings of particular theoretical significance are outlined below.

1) There are four types of knowledge in classroom teaching in higher education: a) pedagogical content knowledge, b) knowledge of content, c) current knowledge of learners, and d) knowledge of learners' background and appropriate pedagogy that are inter-related in a complex knowledge base.

2) There is a marked difference in the knowledge base for teaching in higher education than teaching in elementary and high school settings (e.g., Grossman, 1988; Leinhardt & Smith, 1985; Shulman, 1986b) which emphasize the significance of pedagogical knowledge. Results indicate that the only elements of teaching typically defined as pedagogical knowledge (e.g., Reynolds, 1992) that were highly evident in the knowledge base for teaching in this study were knowledge of planning, general teaching strategies, and classroom management which all inter-correlated with knowledge of learners' background to form one type of knowledge. Similarly, knowledge of curriculum or classroom routines often cited element of the knowledge base for teaching were not found among the knowledge base for teaching in higher education.

3) Lastly, results indicate that the definition of content knowledge in teaching in higher education is broader than an understanding of

declarative elements of subject matter (e.g., Alexander, et al., 1991). It also includes procedural elements of teacher knowledge typically thought of as being indicative of pedagogical content knowledge, and to some extent even general pedagogical knowledge.

Overall, the findings from this study support claims that university professors, base their teaching, to a large extent, on their knowledge of content, but differ from other accounts of teacher knowledge in terms of the breadth, depth, and role of this type of knowledge. The findings of this study indicate a different relationship among the elements of the knowledge base for teaching in higher education than at other levels of education. This needs to be taken into account in understanding university teaching, its development, and the design and delivery of faculty development activities.

The findings also support dynamic accounts of teaching that indicate teachers draw on different types of knowledge, goals, lesson structures, and activities according to the academic level and content being taught (e.g., Kagan, 1988).

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